REMARKS

The claims have been amended by substituting first end layer for "one end layer," and second end layer for "other end layer." By using the designations first and second, it is easier to follow the structure that is being claimed. Further, pursuant to the Examiner's suggestion, claim 1 has been amended to employ the art-recognized transitional phase "comprising" instead of "having."

There is no change in scope of the amended claims. Entry of the amendments is respectfully requested.

Review and reconsideration on the merits are requested.

Claims 1-4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,975,660 to Johnson in view of U.S. Patent No. 5,900,642 to Nakatsu et al. Johnson was cited as substantially meeting the terms of claim 1, including a light-emitting layer of multiple quantum well structure in which both end layers of the light-emitting layer are barrier layers and where one of the end layers is thicker than the other end layer. The Examiner relied on Nakatsu et al. as disclosing n-type and p-type cladding layers, respectively. The reason for rejection was that it would have been obvious to include the cladding layer structure of Nakatsu et al. in the device of Johnson in order to fulfill residence conditions.

The Examiner further considered that the limitations of claims 2-4 would have been an obvious matter of finding an optimum workable range.

Applicants traverse, and respectfully request the Examiner to reconsider for the following reasons.

The VCSEL of Fig. 2 of Johnson cited by the Examiner includes active region 110 comprising well layers 120 and barrier layers 125 sandwiched between first (lower) cladding region 108 and second (upper) cladding region 112.

Contrary to the Examiner's suggestion, *both* end layers of active region 110 are **well layers**, whereas present claim 1 requires both end layers of the light-emitting layer of multiple quantum well structure to be barrier layers. Further, there is nothing in the description of Fig. 12 of Johnson at columns 7-8 which suggests that the barrier layer of the second end layer (21n) is thicker than the barrier layer of the first end layer (21m) as required by present claim 1. This feature of the claimed invention is also not shown or otherwise disclosed in Fig. 12 of Johnson.

As shown in Fig. 2 of the specification, the structure of the invention includes a light-emitting layer 2 of multiple quantum well structure in which well layers 22 and barrier layers 21 are alternately stacked periodically between an n-type clad layer 105 and a p-type clad layer 107. The first end layer 21m of the light-emitting layer is closest to and opposed to the n-type clad layer 105, and the second end layer 21n of the light-emitting layer is closest to and opposed to the p-type clad layer 107. Both the first and the second end layers 21m and 21n are barrier layers, and the second end layer 21n which is closest to and opposed to the p-type clad layer 107 is thicker than the barrier layer 21m of the first end layer that is closest to and opposed to the n-type clad layer 105. As described bridging pages 17-18 of the specification, the total number of the Si-doped GaN barrier layers 21 is 6, and the thickness of each of the five Si-doped GaN barrier layers 21 (*except the other end layer 21n)* is set to 15nm. The Si-doped GaN barrier layer forming the second end layer 21n was set to 20 nm in thickness *which is larger than those of the other barrier layers*.

None of this is disclosed by the cited references.

The effects due to the above structural features of the invention of present claim 1 are described at page 6, lines 23-30 and at page 8, lines 14-18 of this specification. Namely, due to the structure in which both end layers of the light-emitting layer are barrier layers, dispersion of carriers toward the n-type and p-type clad layers is prevented more effectively. Also by configuring the barrier layer of the second layer (21n) thicker than the other barrier layer, electrons which flow into the light-emitting layer from the n-type clad layer through the barrier layer of the first end layer (21m) are effectively enclosed with the well layer which is joined to the second layer (21n).

Notably, Johnson does not disclose or suggest any structure exhibiting the above-noted effects of the invention.

The Examiner further considered that it would have been an obvious matter of finding an optimum workable range as claimed in claims 2-4. In this regard, a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges thereof might be characterized as "routine experimentation." MPEP § 2144.05. However, the Examiner has pointed to nothing in Johnson or Nakatsu et al. which suggests increasing the thickness of each of the barrier layers from the first end layer toward the second end layer (claim 2), or where the second end layer has an impurity concentration low at its junction portion relative to the well layer, highest at its central portion and reduced gradually from the central portion toward the p-type clad layer (claim 3) in the first instance. Thus, it is unclear how the Examiner could reasonably conclude that the subject matter of claims 2 and 3 relates to art-recognized result-effective variables. Claim 4 relates to the structure of the device, and requires that the well layer

joined to the second end layer is not intentionally doped with impurities. The Examiner has also not pointed to any passage of the cited references which discloses the subject matter of claim 4.

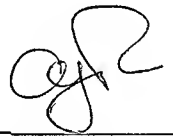
For the above reasons, it is respectfully submitted that the claims are patentable over Johnson in view of Nakatsu et al, and withdrawal of the following rejection under 35 U.S.C. §103(a) is respectfully requested.

Withdrawal of all rejections and allowance of claims 1-4 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Abraham J. Rosner
Registration No. 33,276

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
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CUSTOMER NUMBER

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